COLLEGE OF
ENGINEERING, COMPUTER SCIENCE, & TECHNOLOGY

# Seminar in Interdisciplinary STEM Research

**October 10th – Thursday, 3:05-4:20 PM PST**

Location: E&T C-256

HOSTED BY CREST-CATSUS AND SIKAND SITI CENTERS



## Manveen Kaur, PhD

Dr. Manveen Kaur is an Assistant Professor of Computer Science at Cal State LA, specializing in systems engineering and communication frameworks for wireless cyber-physical systems (CPS). Her research focuses on safety-critical systems with strict Quality-of-Service (QoS) requirements, including Unmanned Aerial Vehicle (UAV) swarms and Connected Autonomous Vehicles (CAVs). Dr. Kaur's research group is currently working on integrating Artificial Intelligence and Machine Learning (AI/ML) models into real-world CPSs, with a particular emphasis on resource-constrained systems. By focusing on systems that can operate under limited resources and be economically deployed, they aim to extend the reach and impact of these technologies to a broader range of real-world applications. Their work has the potential for significant societal benefits, such as supporting Search and Rescue operations or advancing Climate Research, where affordable intelligent solutions are needed. Dr. Kaur earned her PhD in Computer Science from Clemson University in 2022.

**Advancing practical frameworks for AI/ML Deployment in Real-World CPSs**

**Abstract:** Cyber-Physical Systems (CPS), such as UAV swarms, are pivotal in advancing numerous critical infrastructure domains. AI/ML strategies enhance CPS capabilities by enabling more intelligent decision-making, learning system behaviors, adapting to variable conditions, and optimizing performance over time. However, existing research on AI/ML for CPSs largely relies on model performance in simulation environments or offline analysis, leading to simulation-to-reality discrepancies due to the computational and communication constraints inherent in resource-constrained CPSs. A significant gap in the current research is the absence of extensive, measurement-based evaluations of AI/ML solutions in physical CPS testbeds under diverse operating conditions. In today's talk, we will discuss early results from our recent work where we conduct a rigorous, measurement-based evaluation of how computational and communication resources in a UAV swarm impact the successful application of a fundamental AI/ML strategies for object detection. The lessons learned from this work will contribute to our ongoing work on implementing and validating a comprehensive turnkey solution that enables the application of AI/ML across diverse, cross-disciplinary use cases and facilitate real-world validation of AI/ML strategies proposed by the research community.

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